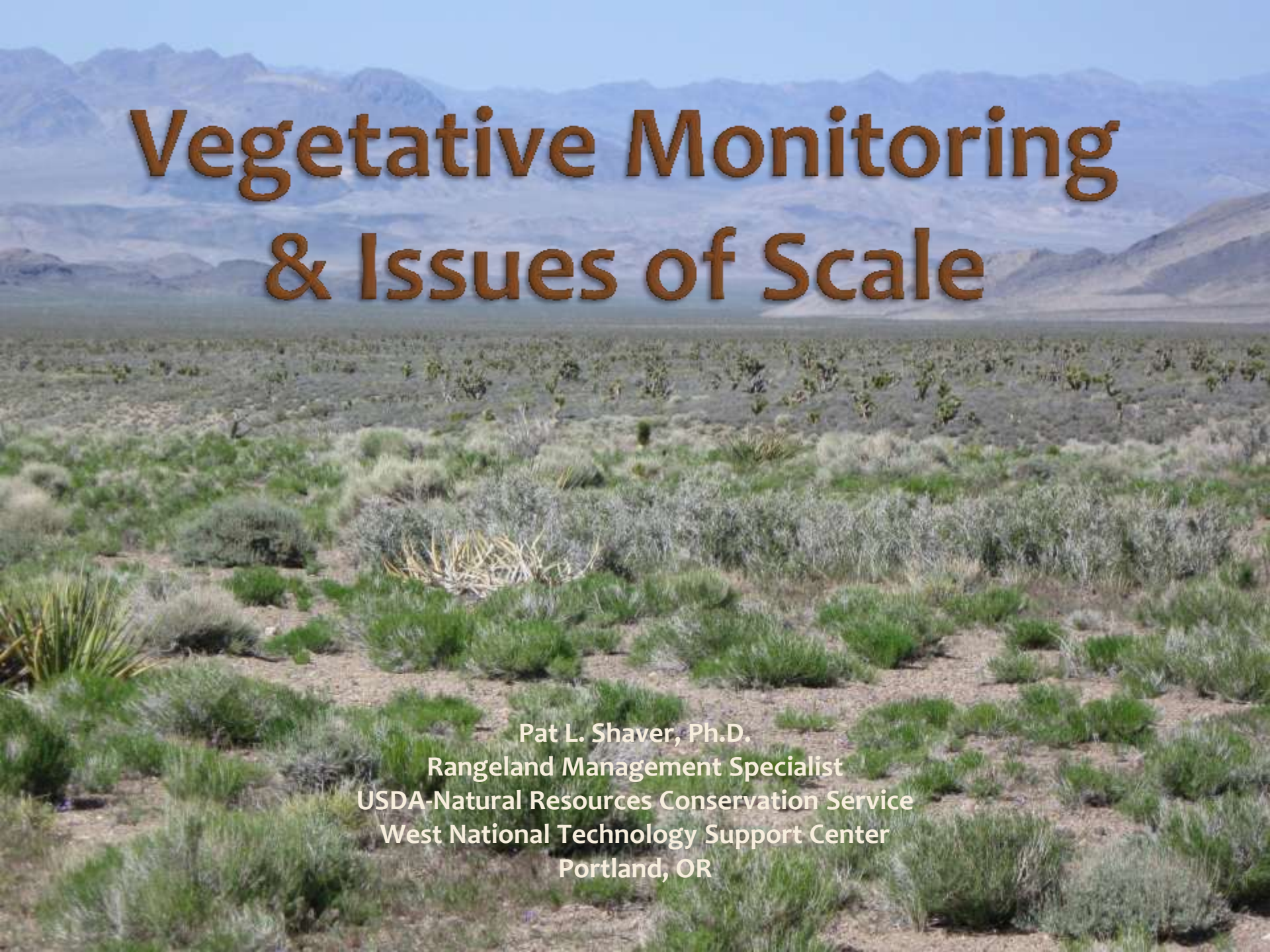


Vegetative Monitoring & Issues of Scale

Pat L. Shaver, Ph.D.
Rangeland Management Specialist
USDA-Natural Resources Conservation Service
West National Technology Support Center
Portland, OR

Terminology

- **Inventory**
- **Monitoring**
- **Assessment**

Inventory

The systematic acquisition and analysis of resource information needed for planning and management. This information is generally not collected as frequently as monitoring data.

Monitoring

The orderly and quantitative collection, analysis and interpretation of resource data to evaluate progress (trend) toward meeting management objectives.

% Cover			
Attribute	1980	1990	2000
Bare Ground	12	20	26
Live Plants (canopy)	47	34	27

Assessment

The process of estimating or judging the value or functional status of a data element. It is generally a "moment-in-time" evaluation that is not repeated in the future (not a monitoring tool).

Why does it matter?

Inventory – Gives information for strategic and tactical level planning

Monitoring – Gives information for operational and tactical level planning

Assessment – Gives point in time conditions - Can be from either inventory or monitoring data

What is being Done?

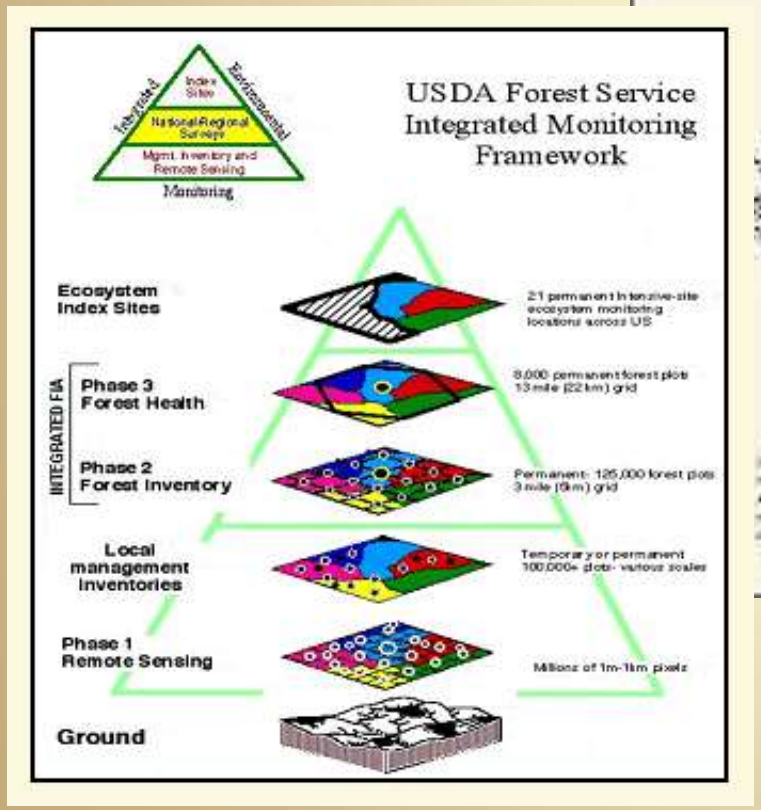
USDA-FS- Forest Inventory and Analysis (FIA)

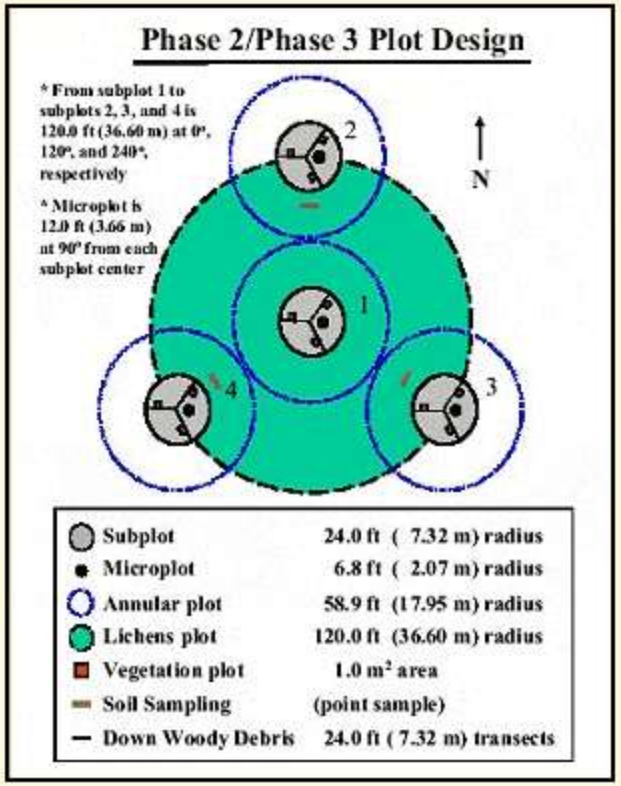
USDI-BLM – Assessment, Inventory, Monitoring (AIM)

USDA-NRCS – Natural Resources Inventory (NRI)

Forest Inventory and Analysis

USDA - Forest Service





Assessment, Inventory & Monitoring

USDI - Bureau of Land Management

COLLECT ONCE, USE MANY TIMES!

Terrestrial Core Indicators

(bare ground, veg. comp/cover, veg. ht., veg. canopy gaps, veg. census, soil aggregate stability & soil toxins)

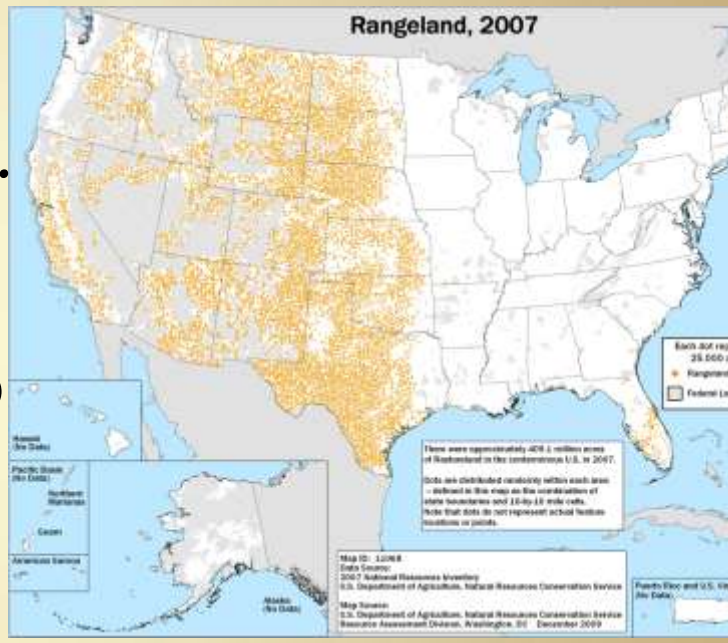
- Soil/site Stability
- Hydrologic Function
- Biotic Intergrity

- Land Treatment Digital Library
  - Local legacy data and new core indicators +
- Rapid Ecoregioinal Assessment
  - Uses existing local data
  - Regional level information of trends
- Joint NRI with NRCS
  - National random point sample with core indicators +

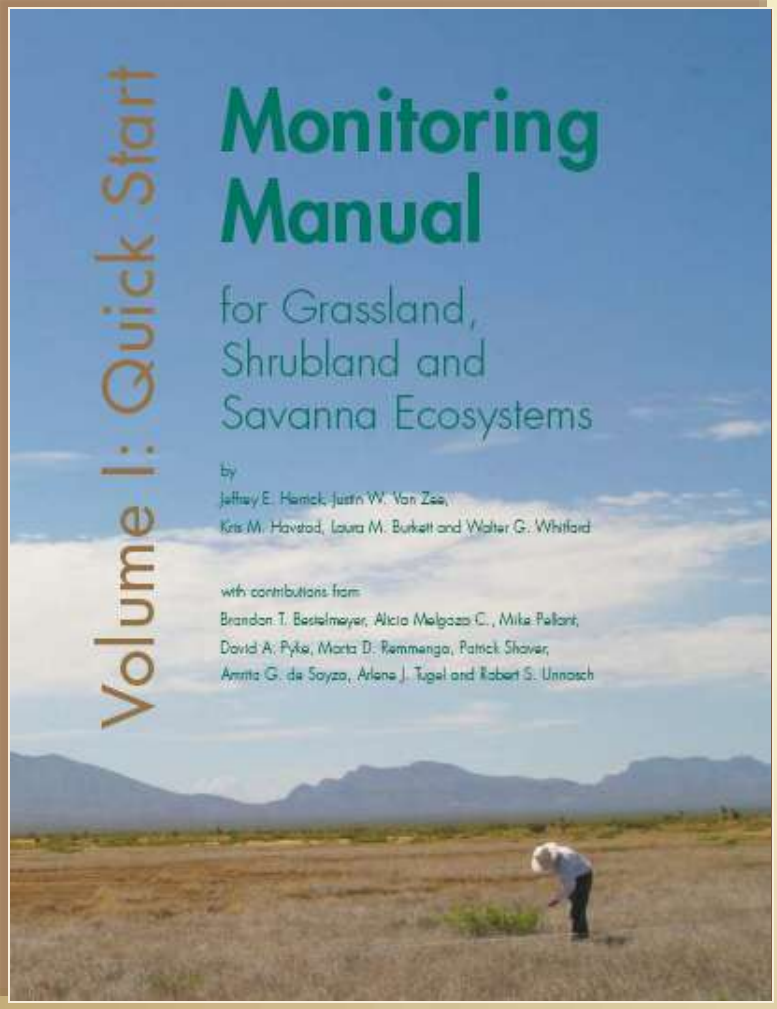
National Resources Inventory

USDA - Natural Resources Conservation Service

- NRI rangeland on-site data has been collected in 17 western states and Florida.
- The NRI rangeland on-site data are collected on a subset of NRI sample points.
- Rangeland estimates of 405 million acres of non-federal rangeland in these states.
- Current conditions based on 10,000-11,000 NRI points between 2003 and 2006.
- An interagency group—USDA-NRCS, USDA-ARS, USDI-BLM & USDI-USGS worked to develop field data collection protocols and data elements that could be used for national inventories.

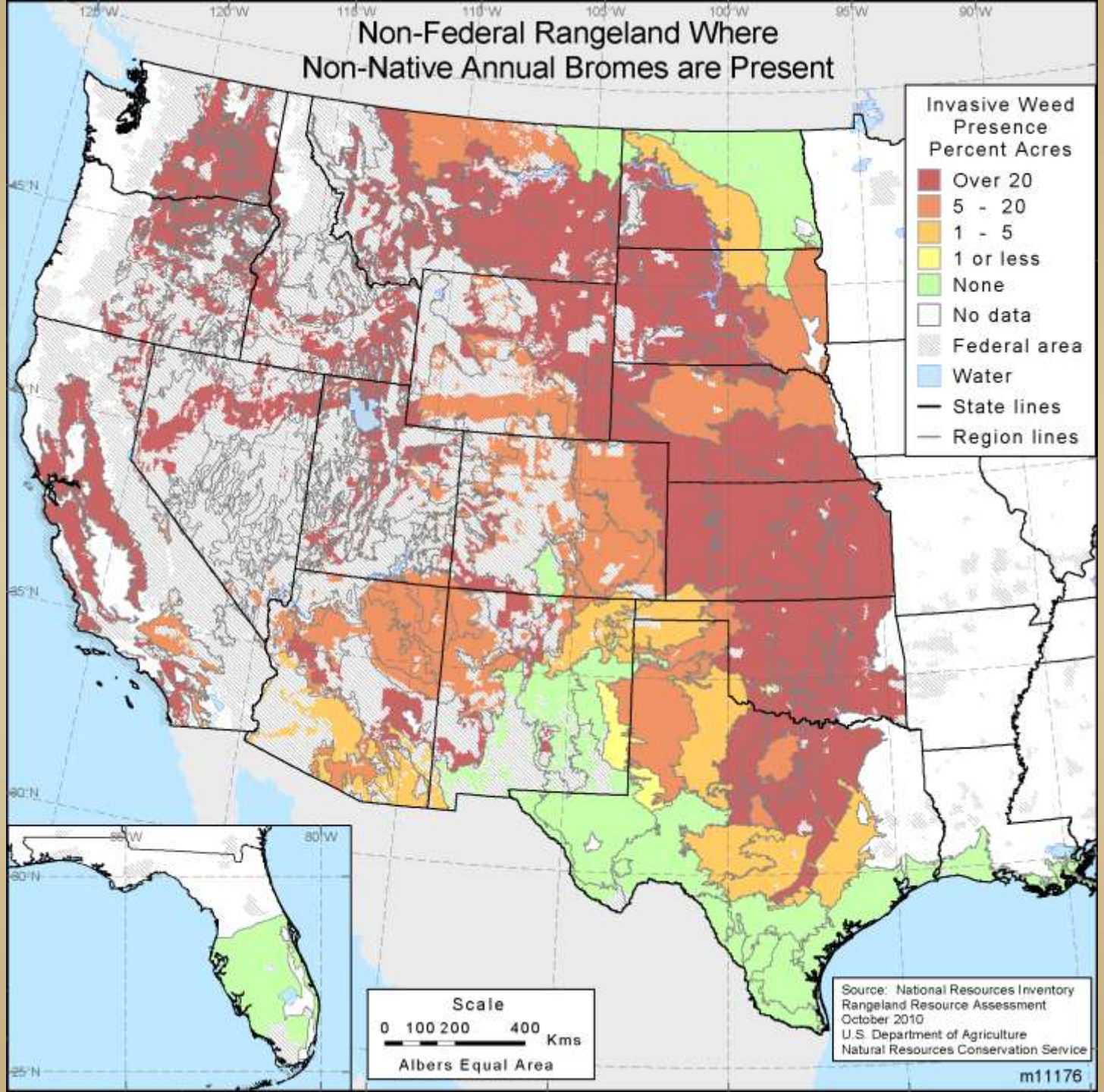


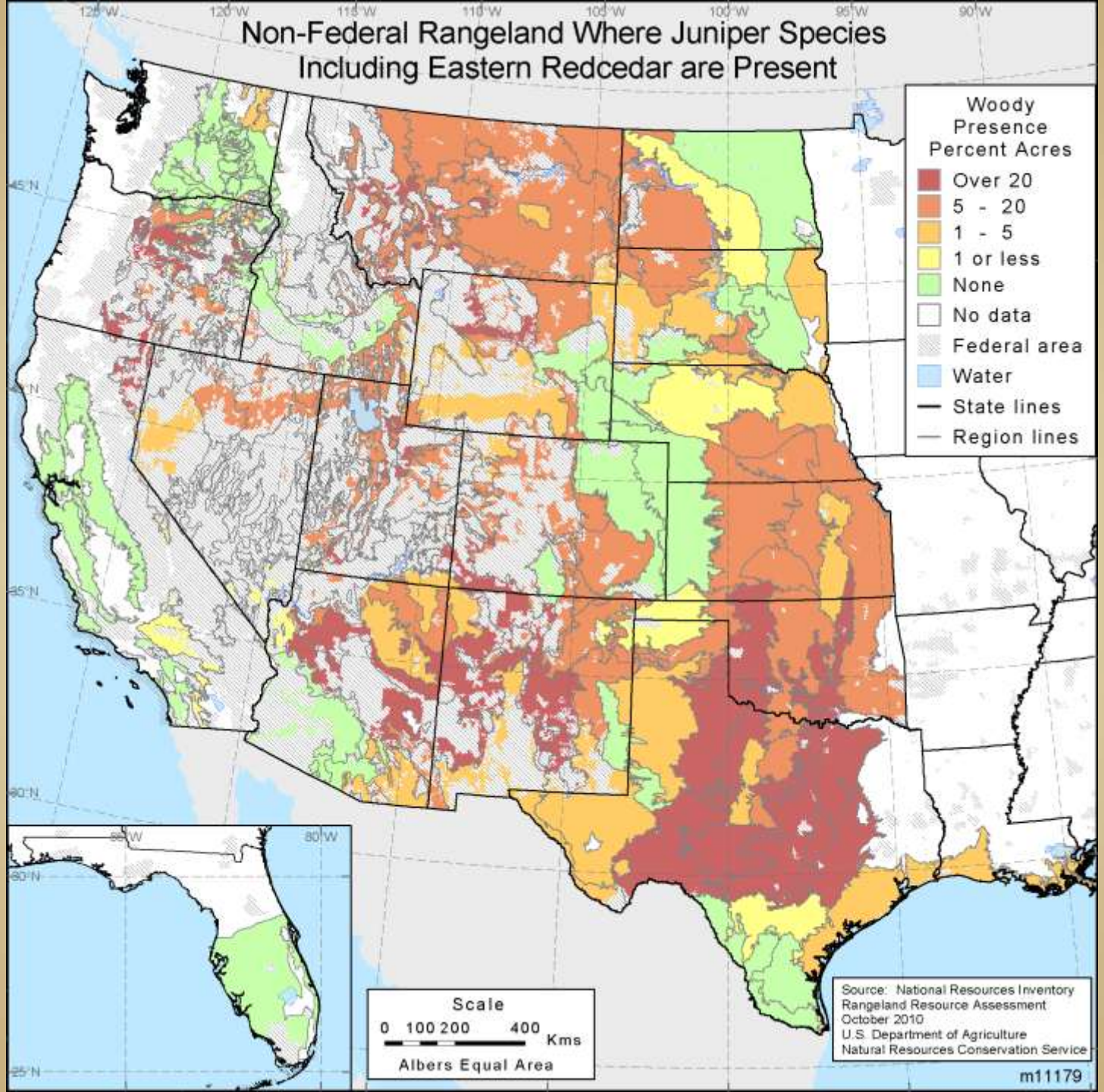
Data Collection Methods

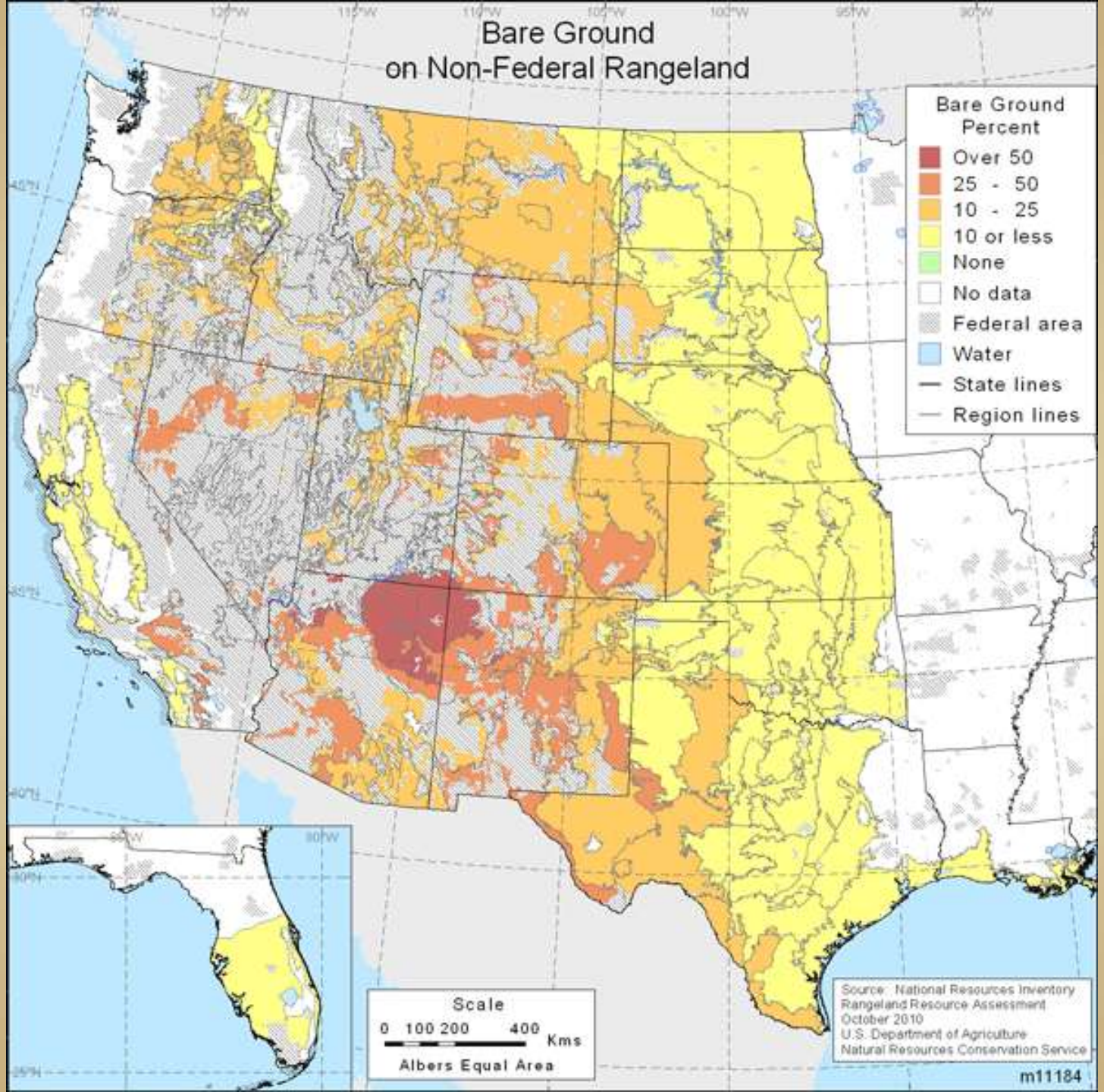


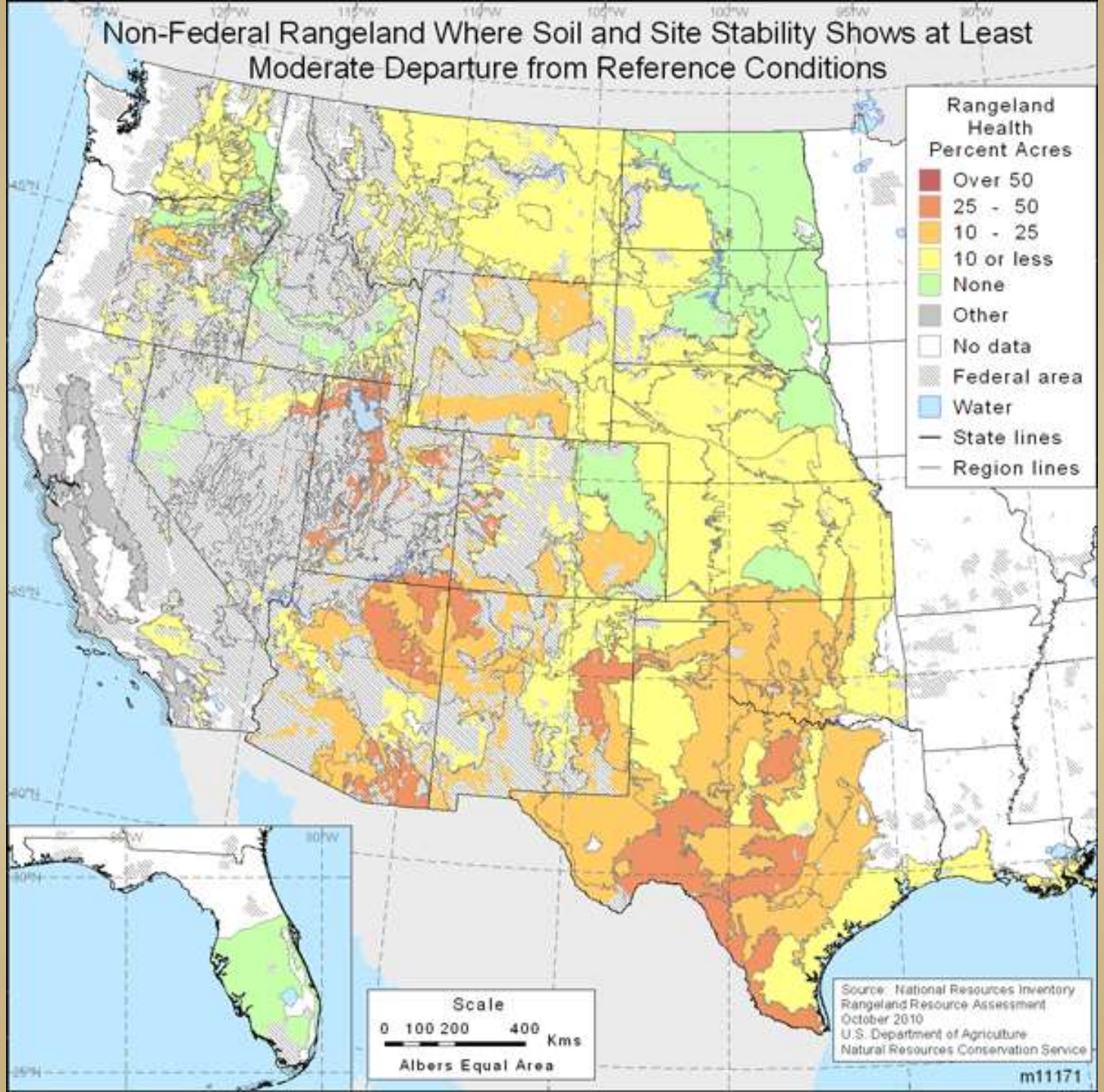
Common Data Elements and Collection Protocols

• Line Point Intercept	Bare ground Plant species foliar cover Biological crust Rock Litter Plant height (herbaceous and woody)
• Canopy Gap	Gaps in plant canopies greater than 1 foot
• Soil Aggregate Stability	Stability rating 1- 6
• Rangeland Health Assessment	Attribute rating (soil/site stability, hydrologic function, biotic integrity)
• Plant Census	Presences or absences by species

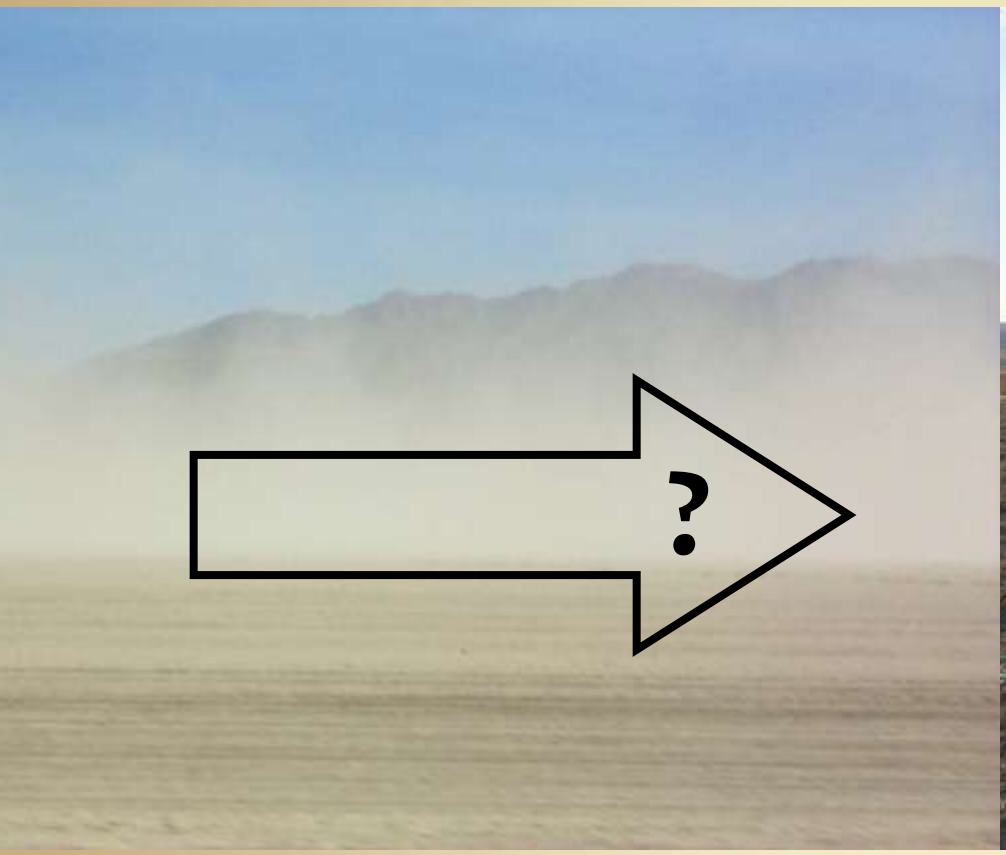

Non-Federal Rangeland Where
Non-Native Annual Bromes are Present
Invasive Weed
Presence
Percent Acres
Over 20
5 - 20
1 - 5
1 or less
None
No data
Federal area
Water
State lines
Region lines
Scale
0 100 200 400 Kms
Albers Equal Area
Source: National Resources Inventory
Rangeland Resource Assessment
October 2010
U.S. Department of Agriculture
Natural Resources Conservation Service
m11176


Non-Federal Rangeland Where Juniper Species
Including Eastern Redcedar are Present
Woody
Presence
Percent Acres
Over 20
5 - 20
1 - 5
1 or less
None
No data
Federal area
Water
State lines
Region lines
Scale
0 100 200 400 Kms
Albers Equal Area
Source: National Resources Inventory
Rangeland Resource Assessment
October 2010
U.S. Department of Agriculture
Natural Resources Conservation Service
m11179


Bare Ground
on Non-Federal Rangeland
Bare Ground Percent
Over 50
25 - 50
10 - 25
10 or less
None
No data
Federal area
Water
State lines
Region lines
Scale
0 100 200 400 Kms
Albers Equal Area
Source: National Resources Inventory
Rangeland Resource Assessment
October 2010
U.S. Department of Agriculture
Natural Resources Conservation Service
m11184


Non-Federal Rangeland Where Soil and Site Stability Shows at Least Moderate Departure from Reference Conditions
Rangeland Health Percent Acres
Over 50
25 - 50
10 - 25
10 or less
None
Other
No data
Federal area
Water
State lines
Region lines
Scale
0 100 200 400 Kms
Albers Equal Area
Source: National Resources Inventory
Rangeland Resource Assessment
October 2010
U.S. Department of Agriculture
Natural Resources Conservation Service
m11171

What's the reference?



What's possible?

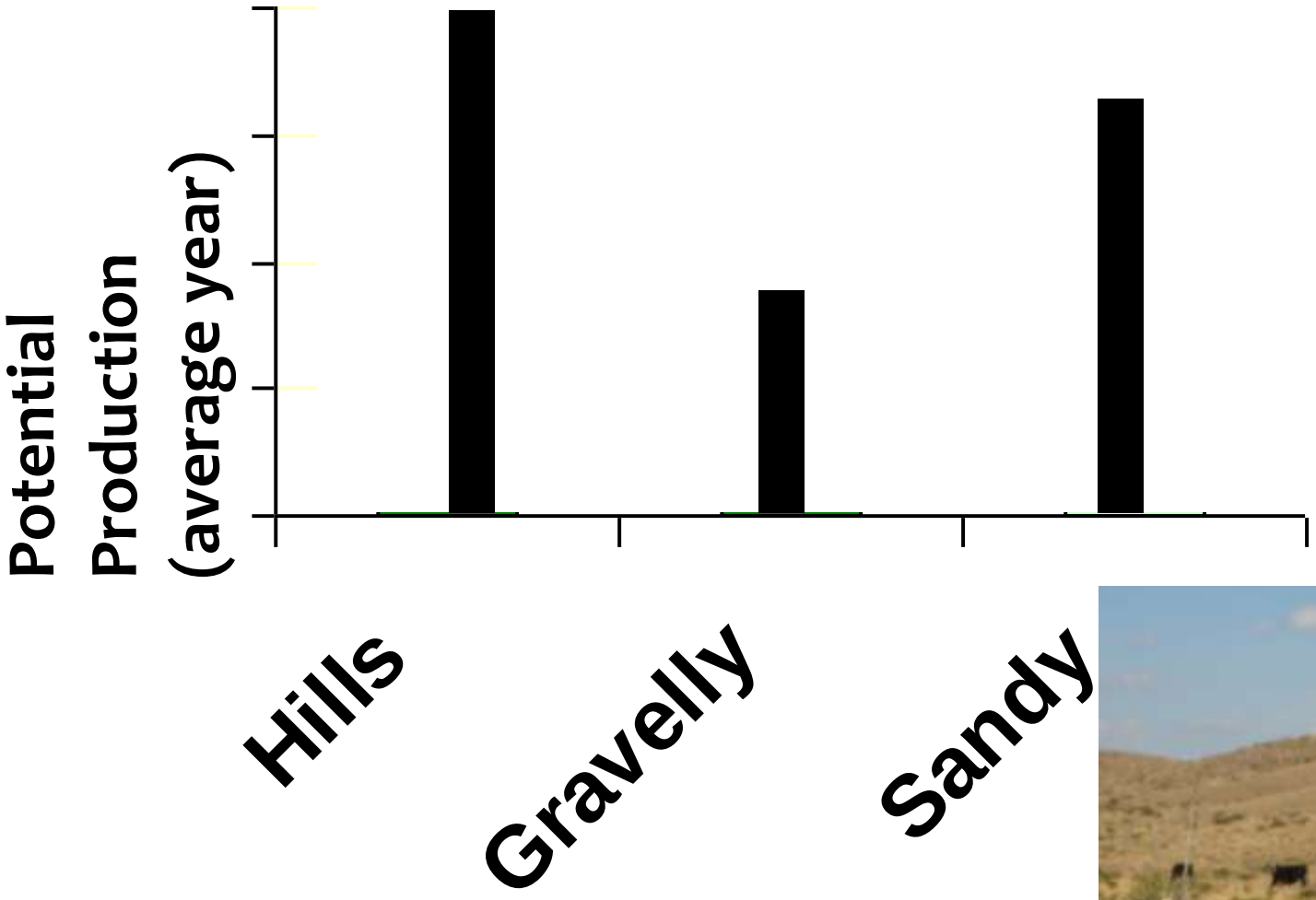
*What's **possible** depends on **soils** and **climate (= ecological site)***

Ecological site: a kind of land with specific physical characteristics, which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management.

Example: comparison of production and resilience for 3 ecological sites

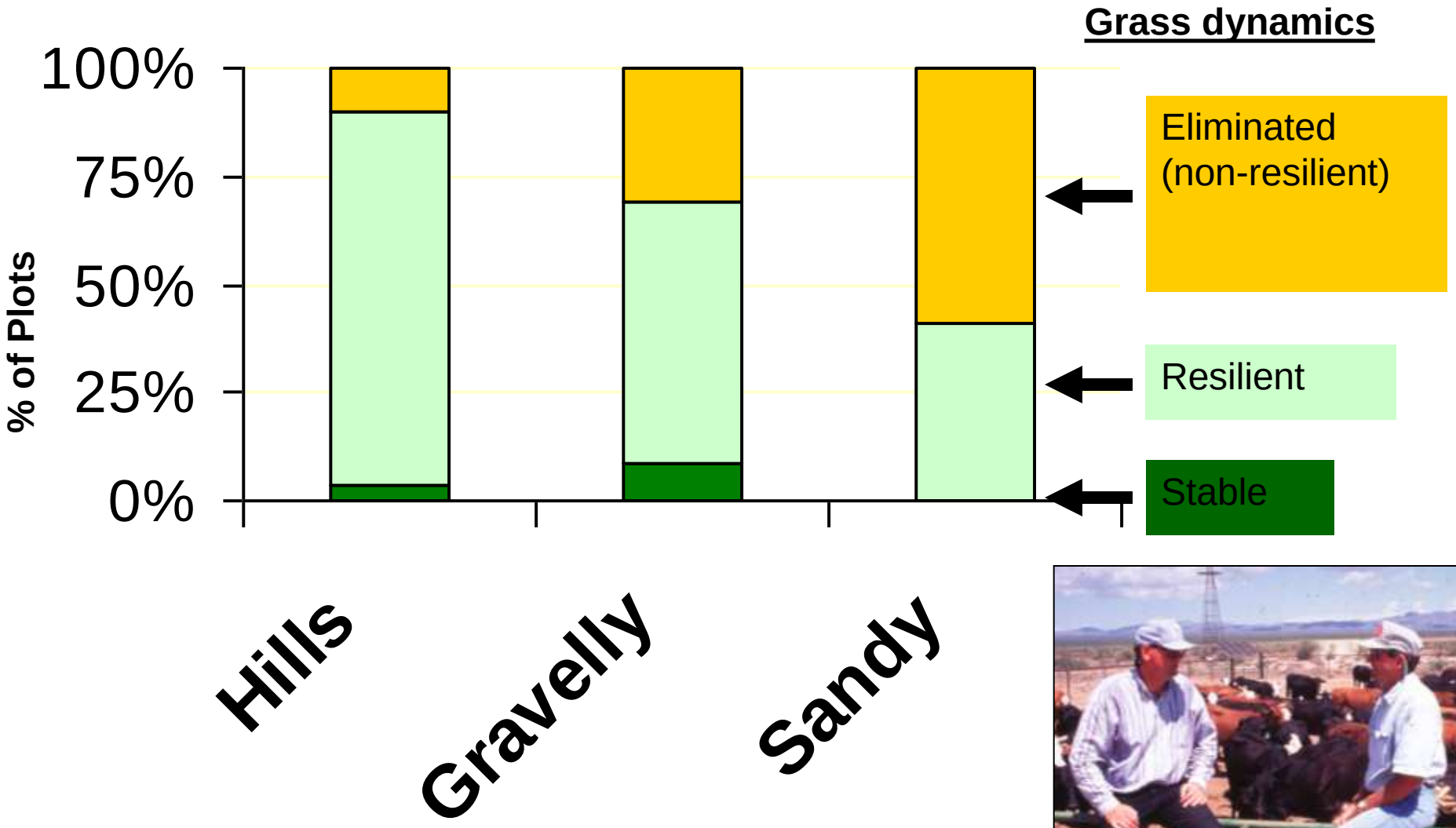
New Mexico, USA
(Chihuahuan Desert)

Ecological sites affect potential grass production



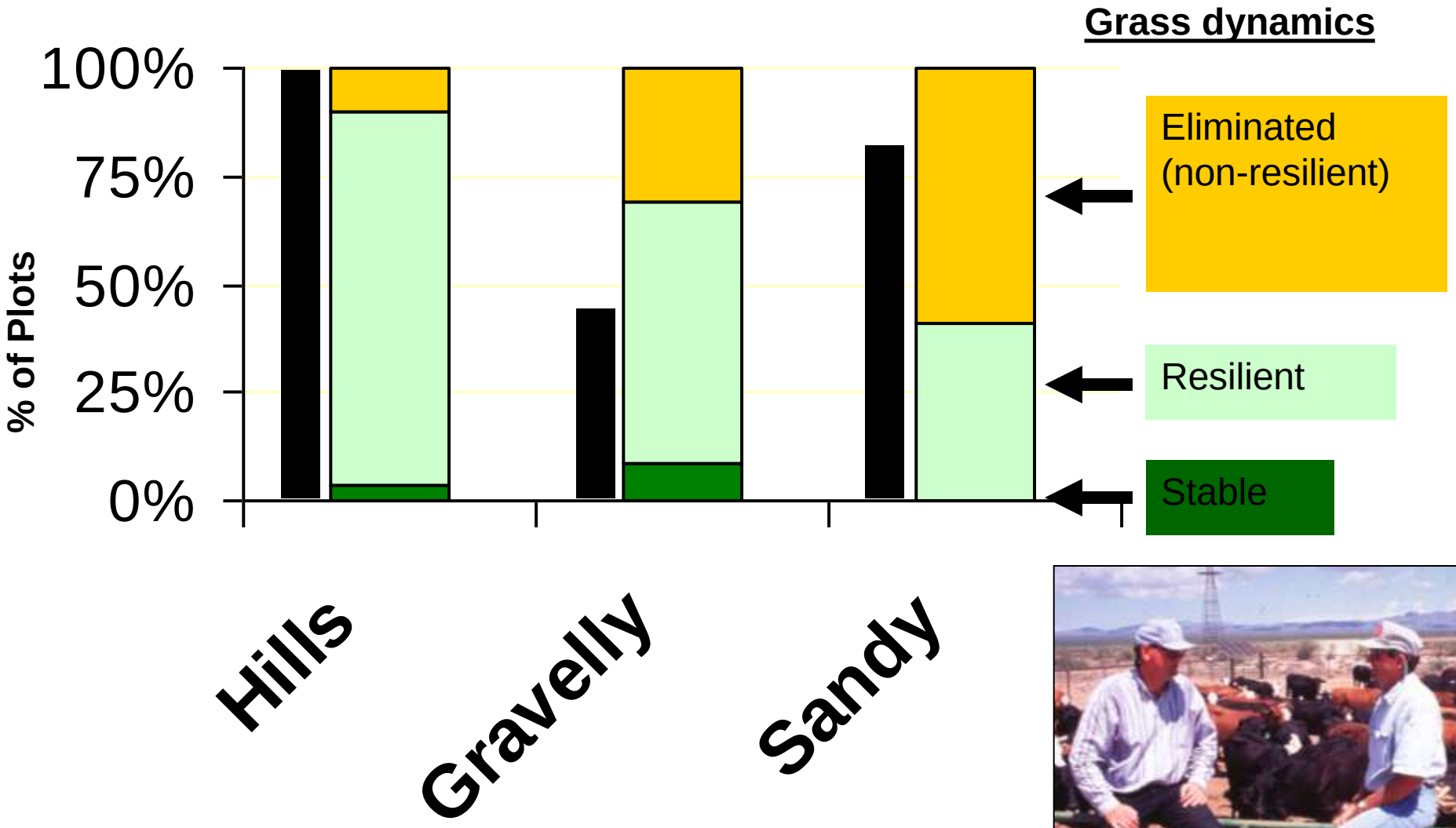
NRCS Data

Ecological Sites affect grass resilience



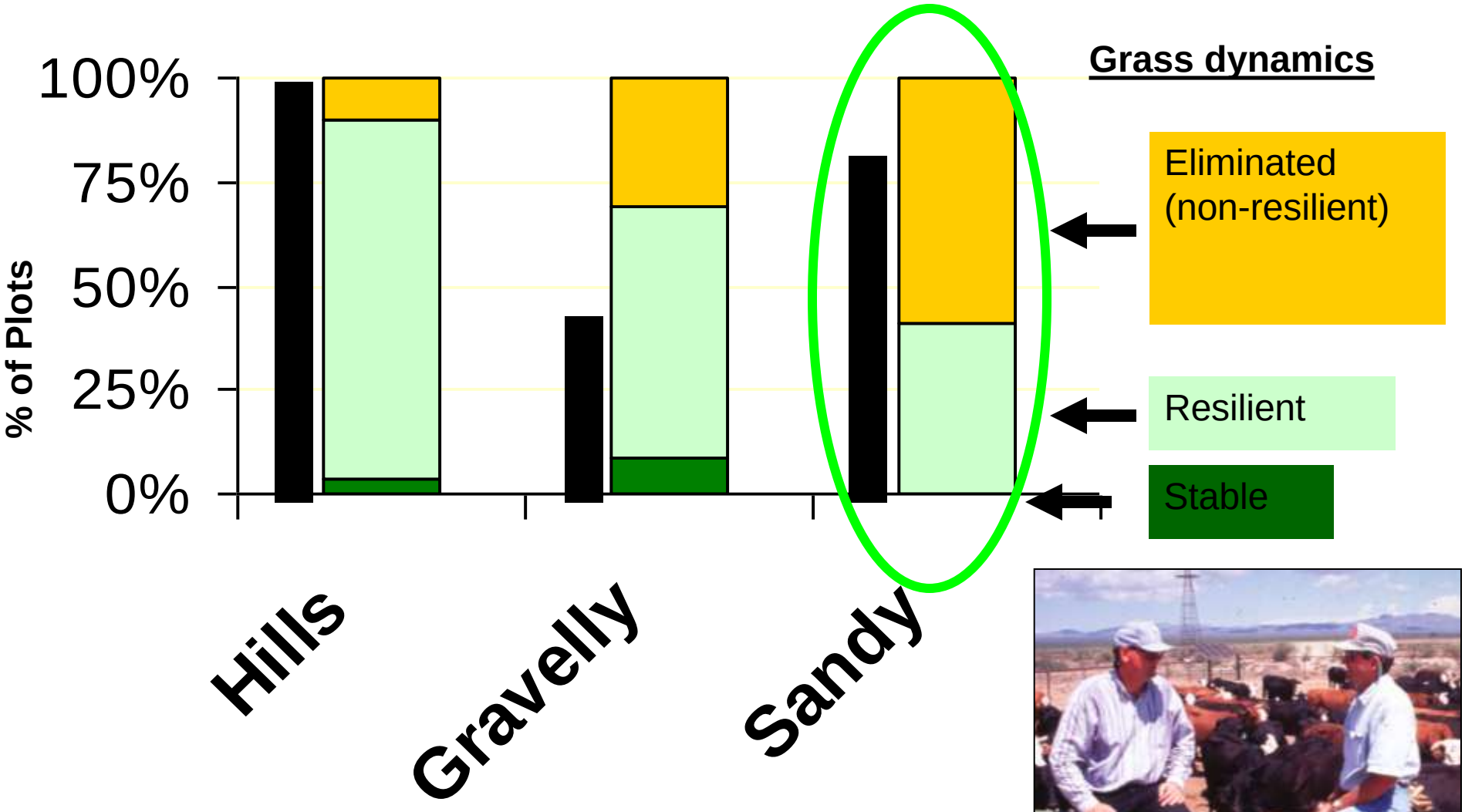
B. Bestelmeyer/BLM data, 123 plots (1970-2003)

Ecological Sites affect grass resilience



B. Bestelmeyer/BLM data, 123 plots (1970-2003)

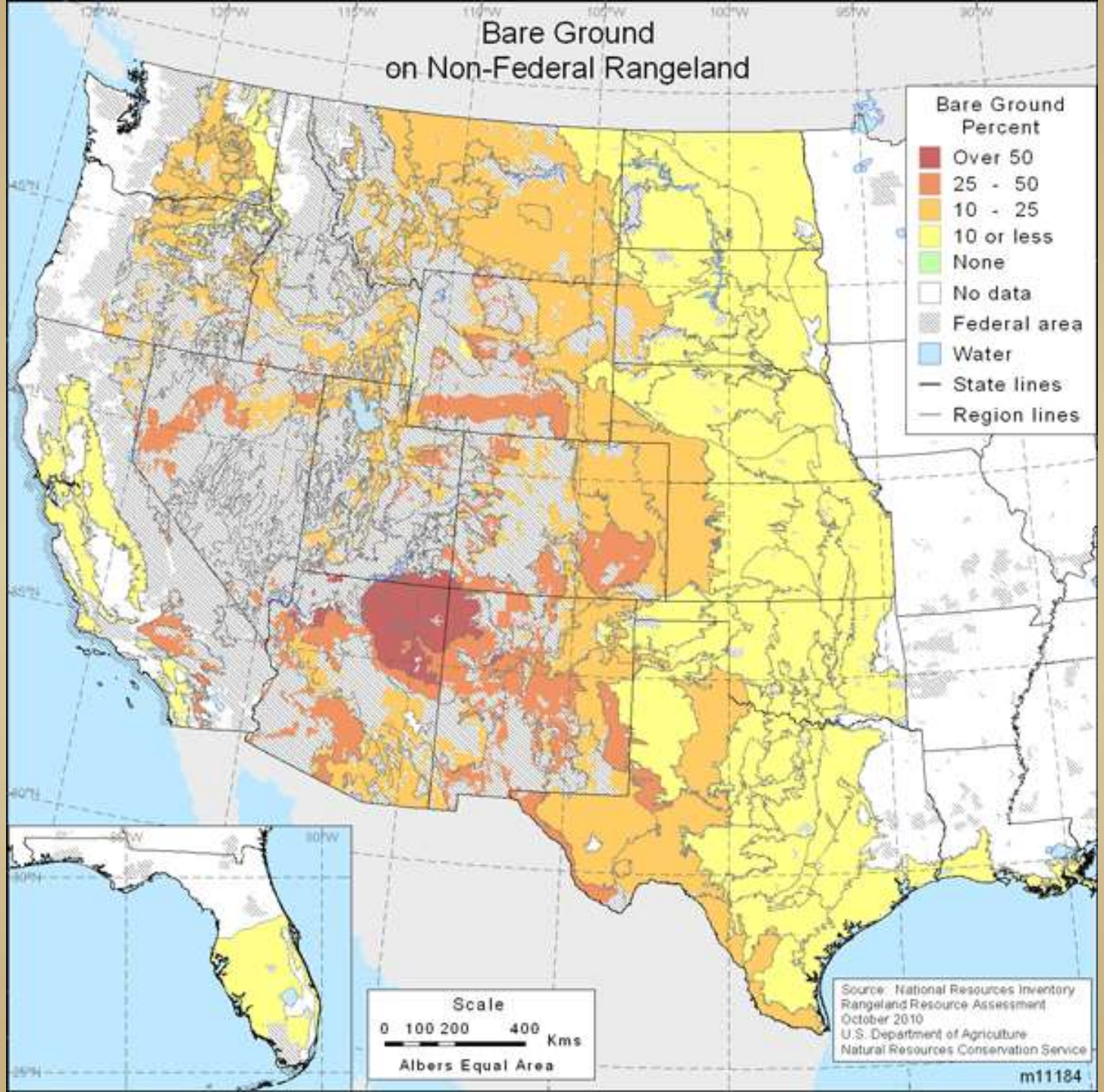
Ecological Sites affect grass resilience



NRCS + B. Bestelmeyer/BLM data, 123 plots (1970-2003)

Knowing what's **possible** provides:

- consistent standards for inventory, assessment & monitoring
- complete range of management options


Bare Ground
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Bare Ground Percent
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Region lines
Scale
0 100 200 400 Kms
Albers Equal Area
Source: National Resources Inventory
Rangeland Resource Assessment
October 2010
U.S. Department of Agriculture
Natural Resources Conservation Service
m11184

Knowing what's realistic provides:

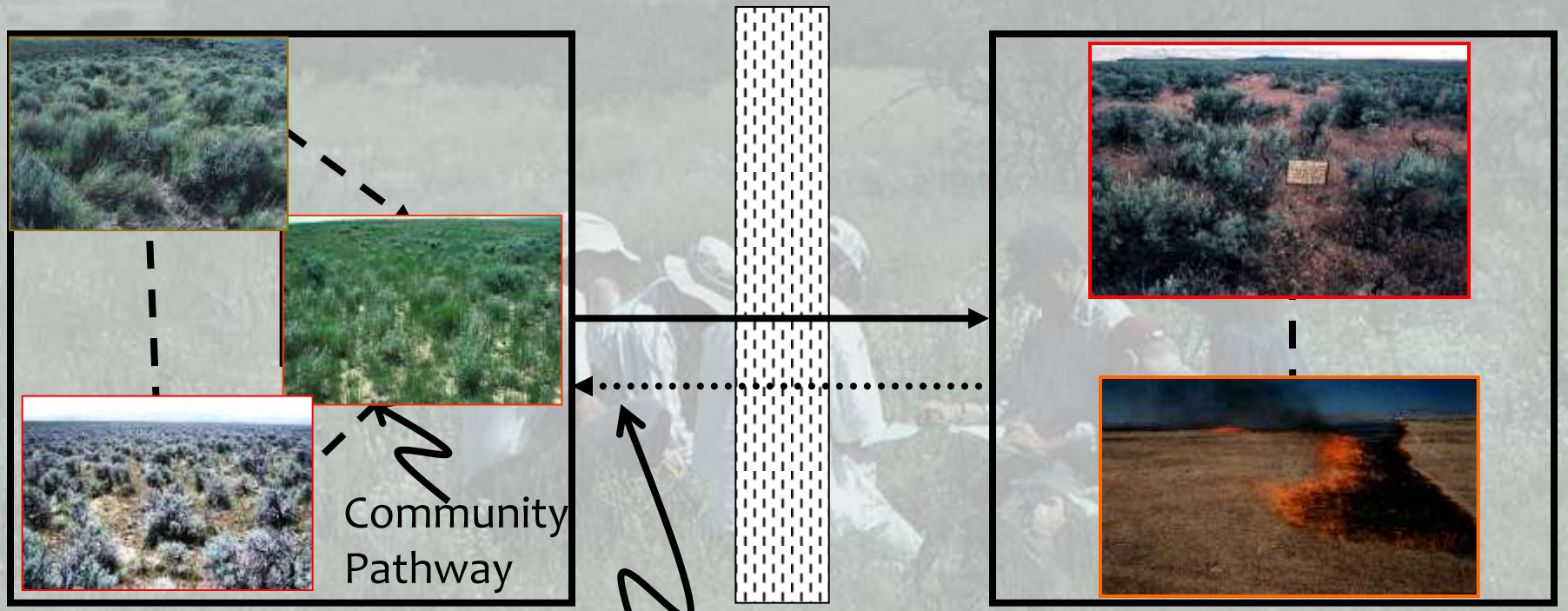
- a secondary standard for inventory, assessment & monitoring
- rationale for focusing limited resources on specific areas

State & Transition Models

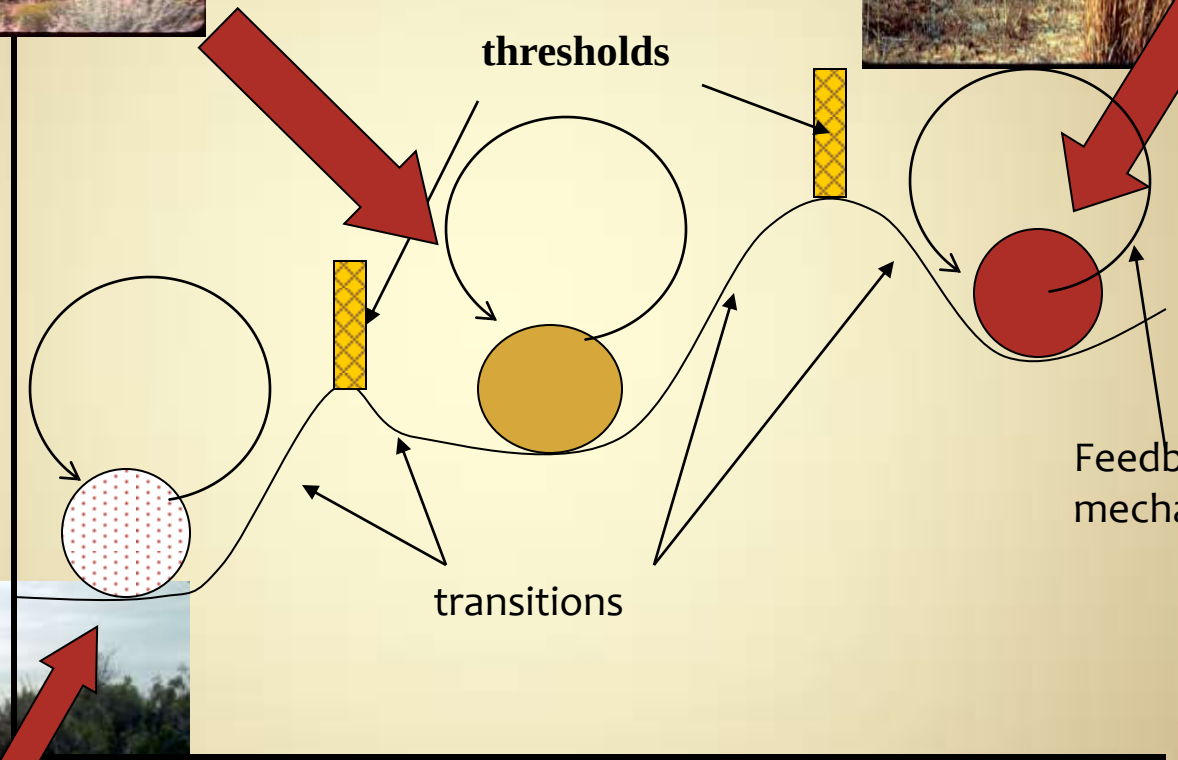
Reference State
Shrub – Native Perennial Grass

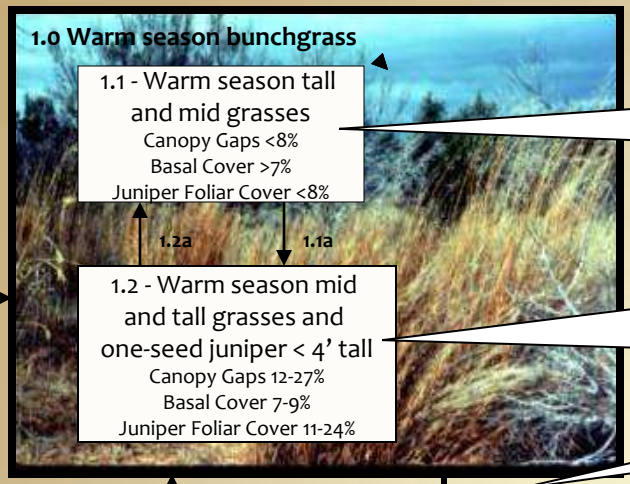
Threshold?

Invasive-dominated State
Invasive Annual Grass



After Stringham et al. 2003 J. Range Mgm


thresholds
Vegetation attribute(s)
transitions
Feedback
mechanisms
time



1.1a: " … time since last fire or by a series of dry years followed by wet years. … opportunity for juniper seedling establishment increases. … decreases herbaceous production, crown cover and organic matter input into the soil, … allow juniper seed germination and establishment…"

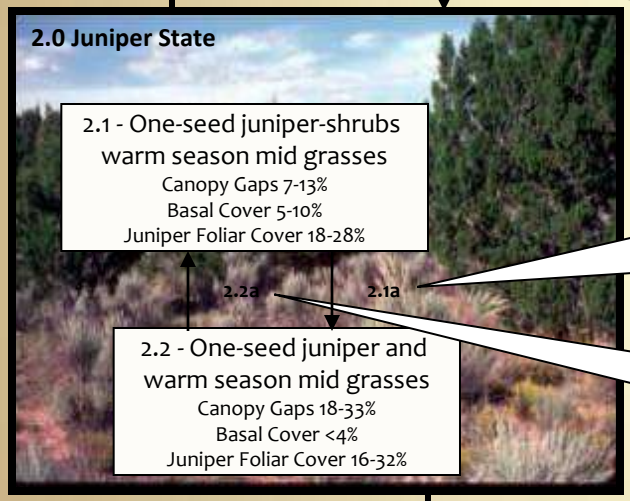
1.2a:"… fire frequency allows for ground fires that remove juniper seedlings and established plants less than 1.5 meters tall…"

T1a: "… slow variables and triggers for this transition are the elimination of fire due to decrease in fine fuels allowing juniper canopy. The threshold values… surface soil stability < 3.4, basal cover <7%, juniper foliar cover >24%, juniper >4' tall…"

R2a

T1a

R2a:"… removal of juniper canopy cover to < 5% with minimal soil surface disturbance… management actions that increases herbaceous production and favors the establishment and growth of warm season tall and mid grasses…"



2.1a:"… juniper canopy increases with time since last fire …other management action to reduce juniper canopy… increase in juniper canopy decreases shrub and herbaceous production and cover… shrubs and tall grasses decrease or are eliminated… drought years followed by wet years will allow for increase in juniper establishment…"

2.2a:"… management actions that decrease juniper canopy and increase herbaceous and shrub production… can include prescribed burning, chemical or mechanical brush management, while other management actions are aimed at increasing herbaceous production… "

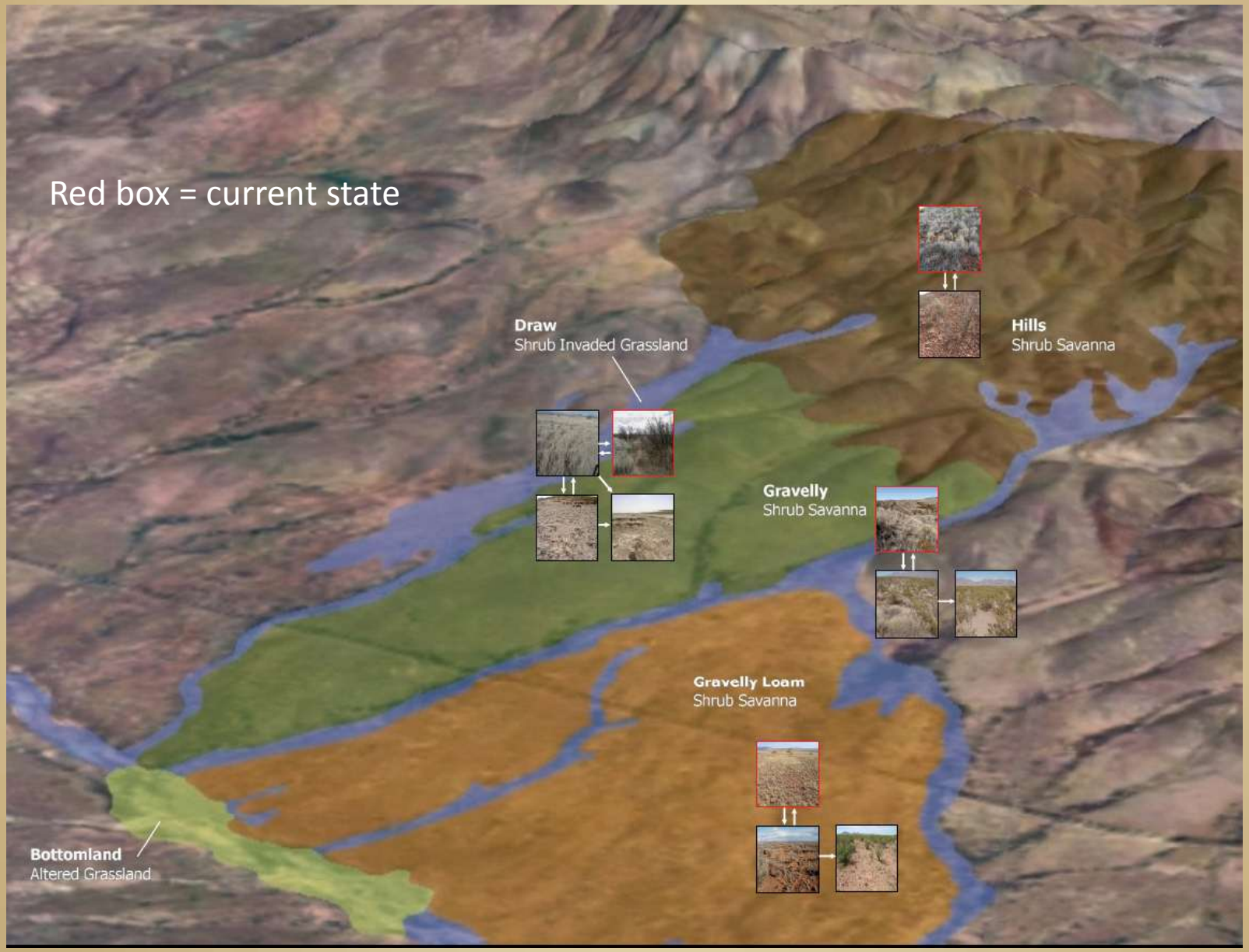
T2a

T2a:"… slow variables and trigger for this transition are increase in juniper seedling establishment and juniper cover… caused by management actions that lead to decreased herbaceous production and decreased organic matter inputs… by lack of management actions that actively reduce juniper canopy cover… threshold values…surface soil stability <2.4, bare ground >40%, canopy gaps >30%, basal cover <4%. …"

R3a

R3a:"… management and restoration planned must decrease juniper canopy to <5%…little or no surface disturbance, management actions must increase herbaceous production… allow for litter accumulation… improve organic matter inputs to stabilize soil surface… "

Maps of ecological sites and states specify where different interventions are needed in a landscape to attain particular services/values



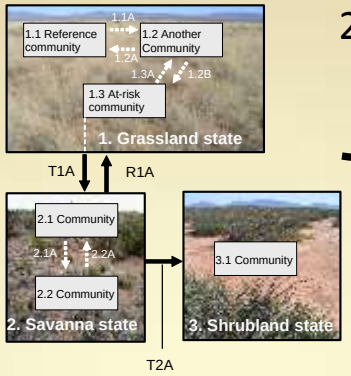
Landscape-level model-based restoration projects

1. Collaboration

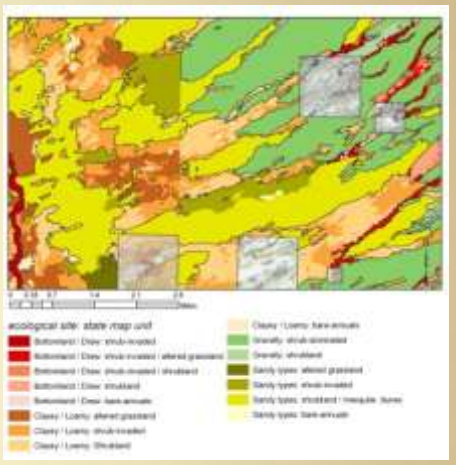
What are the risks and known problems?

Where are they located?

At what scales must solutions be sought?

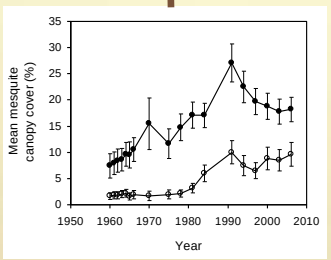


2. Ecological sites/state-and-transition models, indicators, and management practices



3. Maps of ecological sites and states

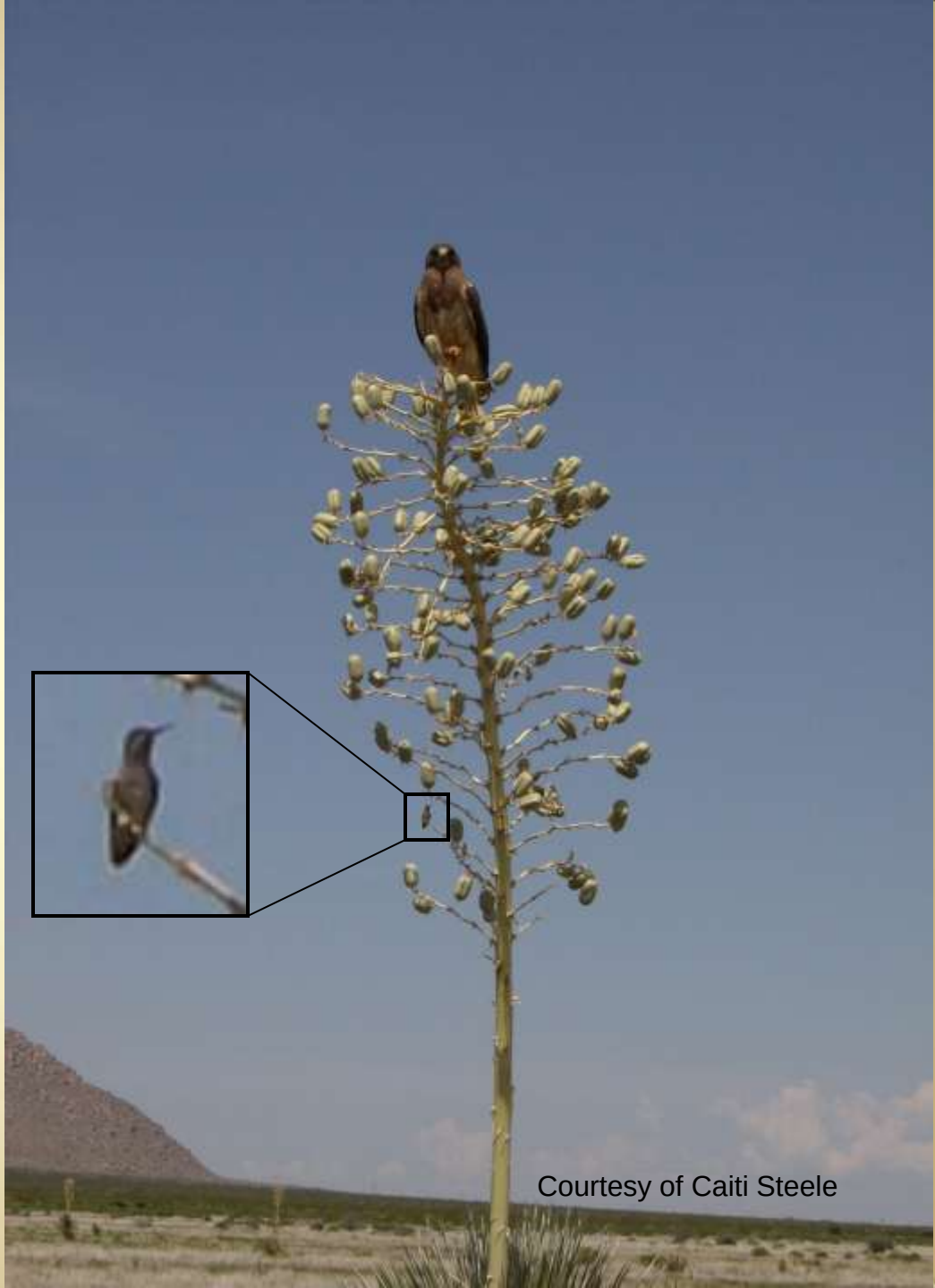
6. Database results and modify models, collaborative learning



4. Apply intervention or do nothing

5. Monitoring to test models
(did we cross a threshold or restore the desired species?)

With the right planning, design and tools, data collected for use at one scale and purpose – can be used at other scales and purposes.

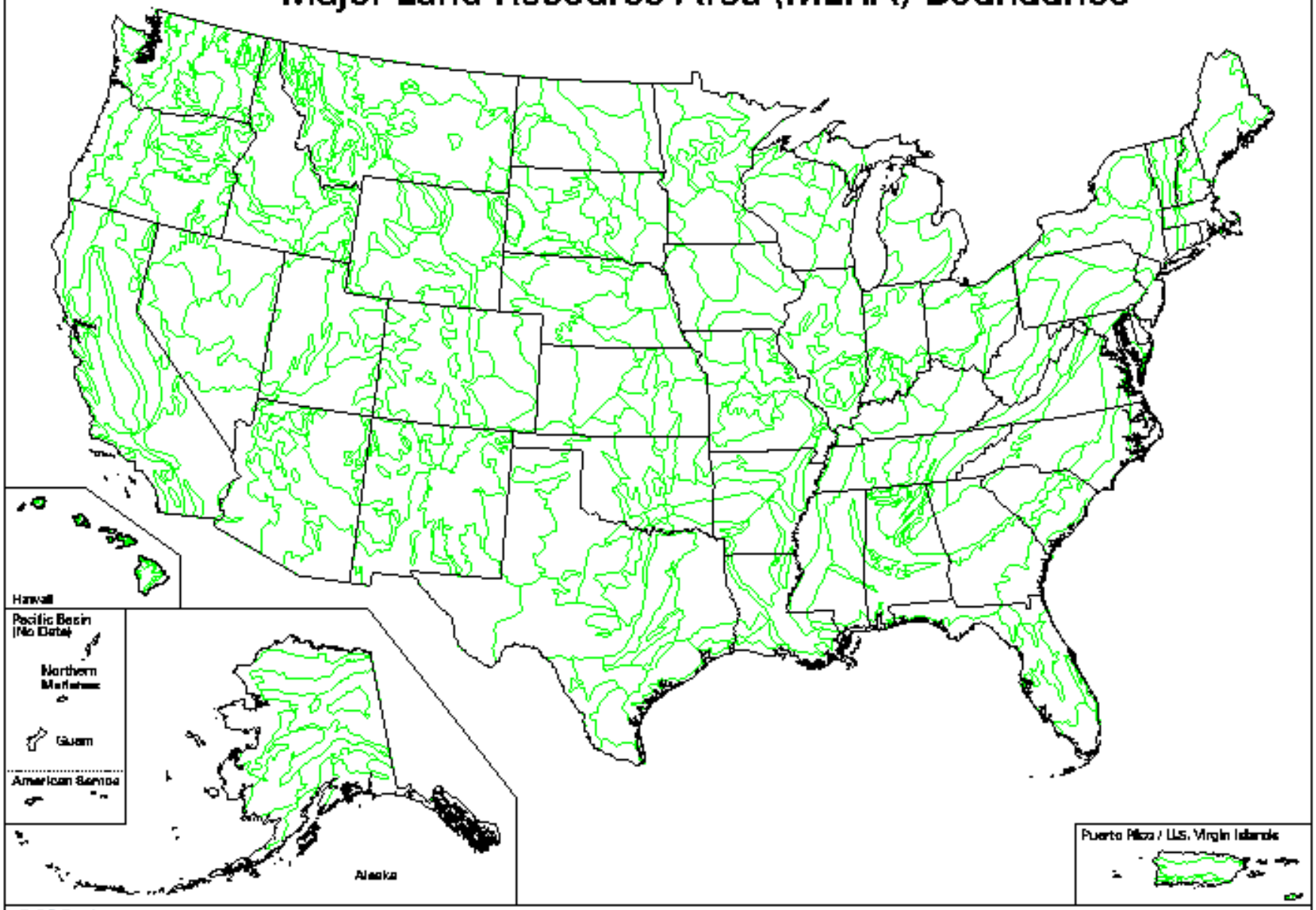


Courtesy of Caiti Steele


It is always good to have a plan
and know which way you are going!
Thank You


Thank You

Major Land Resource Area (MLRA) Boundaries



USDA

U.S. Department of Agriculture
Natural Resources Conservation Service
Resource Assessment and Strategic Planning Division
Washington DC July 1999

Map ID: 2147
For proper interpretation, see Explanation of Analysis for this map at our web site. Search for "USDASOTL" to locate our map index.

State-and-Transition Model